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10/823,645	04/14/2004	Hideo Okayama	403042	4910

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EXAMINER	
MURALIDAR, RICHARD V	
ART UNIT	**PAPER NUMBER**
2838	

DATE MAILED: 02/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

EJL

Office Action Summary	Application No.	Applicant(s)	
	10/823,645	OKAYAMA ET AL.	
	Examiner	Art Unit	
	Richard V. Muralidar	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *04/14/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) The invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7-8, 11-14, 16, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Aiello et al [US 6014323].

With respect to Claim 1, Aiello discloses a power converter including a plurality of power units [Fig. 1 power cells 12-20], each of said power units comprising: an input transformer group [Fig. 1a transformer 469; Fig. 3 transformers 41-43; col. 2 lines 16-20]; including at least one input transformer having at least one primary winding connected with a first polyphase AC power supply [Fig. 1 input 3 phase AC], and at least one secondary winding [Fig. 1 windings 3-11]; a polyphase self-excited rectifier circuit [Fig. 1a rectifiers 451a-c and 452a-c] connected with said secondary winding; a single-phase self-excited inverter circuit [Fig. 1a switches 456-459; Examiner notes switched rectifiers and self-excited rectifiers are functionally equivalent]; and a DC link circuit [Fig. 1a capacitors 453a and 453b] connecting said single-phase self-excited rectifier circuit to said polyphase self-excited rectifier circuit to generate a single-phase power output [Fig. 1a single phase output taken at 454 and 455], wherein mutually adjacent ones of said power units in each phase are sequentially cascaded in series

with one another [Fig. 1a col. 3 lines 22-26; col. 7 lines 7-11], with one of said power units at a first end of a cascade connection being connected with a polyphase AC load [Fig. 1 three phase motor load 1], another one of said power units at a second end of the cascade connection being connected with a neutral point [Fig. 1 neutral point 25], whereby electric power is input from said first polyphase AC power supply to said power units and output from said power units to said polyphase AC load [col. 3 lines 19-32], or the electric power of said polyphase AC load is regenerated to said first polyphase AC power supply [col. 8 lines 24-27].

Examiner notes that applicant's invention as well Aiello's invention both incorporates material from Hammond et al in [US 5625545] and [US 5986909]; and that the basic circuit topology is equivalently the same as disclosed by Hammond. Applicant's power unit is an integrated combination of the same input transformers coupled with the exact structure used for Hammond's power cell, which has three phase diode rectifiers at the input and two phase switched inverters at the output, with a capacitor DC link circuit connecting the two. Applicant's phase module is exactly 1 leg of Hammond's power converter, whether comprised of switches, diodes, or self-arc extinguishing devices.

With respect to Claim 2, Aiello discloses said polyphase self-excited rectifier circuit includes mutually parallel-connected phase modules corresponding in number to the number of phases of said first polyphase AC power supply, and said single-phase self-excited inverter circuit includes two phase modules [Fig. 1a Q1 with diode 460 and

Q2 with diode 462 is one phase module, and Q3 with diode 461 and Q4 with diode 463 is another phase module, per applicant's specification in Fig. 5].

With respect to Claim 3, Aiello discloses said phase module includes self-arc-extinguishing semiconductor devices [col. 6 lines 54-58; Examiner notes that any solid-state switch is arc-extinguishing, for example Aiello's IGBT's].

With respect to Claim 4, Aiello discloses said phase modules of said single-phase self-excited inverter circuit have a current rating greater than that of said phase modules of said polyphase self-excited rectifier circuit [Fig. 1a this is necessarily true since power taken from three rectifier phases is routed through two inverter phases 454 and 455 to the load].

With respect to Claim 5, Aiello discloses said DC link circuit includes a filter capacitor [Fig. 1a capacitor 453a] having opposite terminals charged at different potentials, and said single-phase self-excited inverter circuit selectively [col. 3 lines 34-38] outputs one of the potentials in a single phase.

With respect to Claim 7, Aiello discloses said input transformer group [Fig. 1a transformer 469; Fig. 3 transformers 41-43; col. 2 lines 10-20] includes an input transformer having one primary winding and secondary windings corresponding in number to the number of phases of said polyphase AC load [Fig. 1].

With respect to Claim 8, Aiello discloses said input transformer group includes input transformers corresponding in number to the number of phases of said polyphase AC load, each of said input transformers having one primary winding and one secondary winding [Fig. 3; transformers 41-43; col. 2 lines 10-20].

With respect to Claim 11, Aiello discloses said at least one power unit has a passable input capacity different from that of others of said power units [Aiello's power cells are capable of this col. 3 lines 61-63; col. 8 lines 15-21. The controller commands that unit to turn on or off additional power cells 450 in Fig. 1a as needed. See also Hammond US 5625545 col. 2 lines 22-23; col. 3 lines 1-5 and lines 12-13].

With respect to Claim 12, Aiello discloses said at least one power unit has a passable output capacity different from that of others of said power units [Aiello's power cells are capable of this col. 3 lines 61-63; col. 8 lines 15-21. The controller commands that unit to turn on or off additional power cells 450 in Fig. 1a as needed. See also Hammond US 5625545 col. 2 lines 22-23; col. 3 lines 1-5 and lines 12-13].

With respect to Claim 13, Aiello discloses said power units [col. 2 lines 28-35 as many power cells can easily be integrated into a unit as desired] arranged at opposite ends of the cascade connection are connected with second and third, polyphase AC power supplies, other than said first polyphase AC power supply, so that electric power is input from said first polyphase AC power supply to said power units and output to said second and third polyphase AC power supplies [Fig. 3, power cells A1 and A3 draw power from first and third supply windings. Examiner notes that this is simply providing two 3 phase ac supplies, each with its own power converter, units, cells, etc., effectively doubling the capacity by placing another power converter with its own ac supply in series or parallel to the first power converter], or the electric power from said second and third polyphase AC power supplies is reversely supplied to said first polyphase AC power supply.

With respect to Claim 14, Aiello discloses said plurality of power units [col. 2 lines 28-35 as many power cells can easily be integrated into a unit as desired] are divided into a plurality of groups, and in each group mutually adjacent power units in each phase are sequentially cascaded in series with one another, and one of said power units at a first end of the cascade connection is connected with said polyphase AC load, and another one of said power units at a second end of the cascade connection is connected with said neutral point, or said power units at the opposite ends are respectively connected with, second and third polyphase AC power supplies, other than said first polyphase AC power supply [see Figs. 3 and 11; this is a result of placing multiplies of these circuits in series or parallel, each with their own ac 3 phase supply. One of ordinary skill in the art could easy accomplish this for the purpose of expanding the output capability of the device].

With respect to Claim 16, Aiello discloses each of said power units includes a plurality of power cells [col. 2 lines 28-35 as many power cells can easily be integrated into a unit as desired], each power cell having a phase module [Fig. 1a any vertical leg of the rectifier or inverter stage], and when an abnormality occurs in said phase module, said single phase self-excited inverter circuit forcedly fixes switching state of said phase module to inhibit an electric current from flowing into said filter capacitor of said DC link circuit [the switching and control circuitry is capable of this since the topology is the same as applicant's. Also see Hammond US 5986909 col. 2 lines 23-27; col. 4 lines 32-34].

With respect to Claim 18, Aiello discloses said DC link circuit includes a filter capacitor having opposite terminals charged at different potentials, and the poly-phase self-excited rectifier circuit adjusts the input power factor thereof so that the potential of the opposite terminals can be controlled [Fig. 1a is exactly the same as applicant's and can accomplish power factor control in a similar manner- col. 3 lines 34-38; col. 4 lines 35-40].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103[a] which forms the basis for all obviousness rejections set forth in this Office action:

> [a] A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 9-10, and 19 are rejected under 35 U.S.C. 103[a] as being unpatentable over Aiello et al [US 6014323] in view of Salmon [US 5936855].

With respect to Claim 6, Aiello discloses said DC link circuit includes filter capacitors connected in series with one another. However, Aiello does not disclose three capacitor terminals charged at different potentials [i.e. the 2 capacitors in series are center tapped and connected to the inverter stage via a center tap].

Salmon, discloses three capacitor terminals charged at different potentials and said single-phase self-excited inverter circuit selectively outputs one of the potentials in a single-phase potentials [i.e. the 2 capacitors in series are center tapped and

connected to the inverter stage via a center tap- Figs. 1F, 4B, 4D, 5A, 5B, 6A, 13A; col. 10 lines 14-26].

Aiello and Salmon are analogous multiphase ac converters that reduce harmonic distortion. At the time of the invention it would have been obvious to one of ordinary skill in the art to add center tapped capacitors in the dc link circuit to Aiello for the purpose of providing a better harmonic correction function of line currents and also to lower line inductance [Salmon US 5936855 col. 10 lines 15-17].

With respect to Claim 9, Aiello discloses said input transformer group [Fig. 1a transformer 469; Fig. 3 transformers 41-43; col. 2 lines 10-20] includes input transformers corresponding in number to the number of phases of said polyphase AC load [Fig. 1], each of said input transformers having one primary winding and at least one pair of secondary windings comprising a star connection and a delta connection [Fig. 1 secondary windings 6-8 are delta and Figs.10E to 10H secondary windings are star], and said polyphase self-excited rectifier circuit includes two polyphase diode rectifier circuits [Fig. 1a 451a-c, and 452a-c] which are connected in parallel to said filter capacitors, respectively [Fig. 1a capacitors 453a-b] and connected with said star connection and said delta connection, respectively, of said paired secondary windings . Aiello does not disclose that said DC link circuit is comprised of center-tapped capacitors in series.

Salmon discloses that the capacitors in series are center tapped [Figs. 1F, 4B, 4D, 5A, 5B, 6A, 13A etc.; col. 10 lines 14-26. Examiner notes that center-tapped series

capacitors used in this manner are common in the art- Geis et al (US 5903116) Fig. 4 provides another concrete example of this].

Aiello and Salmon are analogous multiphase ac converters that reduce harmonic distortion with motor loads. At the time of the invention it would have been obvious to one of ordinary skill in the art to add center tapped capacitors in the dc link circuit to Aiello for the purpose of providing a better harmonic correction function of line currents and also to lower line inductance [Salmon US 5936855 col. 10 lines 15-17].

With respect to Claim 10, Aiello discloses said input transformer group includes one input transformer having one primary winding and a plurality of pairs of secondary windings corresponding in number to the phases of said first polyphase AC load, each pair of said secondary windings [Fig. 3 transformer 41 has multiple pairs shown grouped in threes. The first and second windings comprise the first pair; the second and third windings comprise the second pair etc.] comprising a star connection and a delta connection [Fig. 1 secondary windings 6-8 are delta and Figs.10E to 10H secondary windings are star], and said polyphase self-excited rectifier circuit includes two polyphase diode rectifier circuits which are connected in parallel [Fig. 1a 451a-c, and 452a-c] to said filter capacitors and connected with said star connection and said delta connection, respectively, of said paired secondary windings. Aiello does not disclose that said DC link circuit is comprised of center-tapped capacitors in series.

Salmon discloses that the capacitors in series are center tapped [Figs. 1F, 4B, 4D, 5A, 5B, 6A, 13A etc.; col. 10 lines 14-26].

Aiello and Salmon are analogous multiphase ac converters that reduce harmonic distortion with motor loads. At the time of the invention it would have been obvious to one of ordinary skill in the art to add center tapped capacitors in the dc link circuit to Aiello for the purpose of providing a better harmonic correction function of line currents and also to lower line inductance [Salmon US 5936855 col. 10 lines 15-17].

With respect to Claim 19, Aiello discloses said DC link circuit includes filter capacitors connected in series with one another, and the poly-phase self-excited rectifier circuit adjusts the input power factor thereof so that the potentials of the three terminals can be controlled [Fig. 1a is exactly the same as applicant's and can accomplish power factor control in a similar manner]. Aiello does not disclose that the capacitors have three terminals charged at different potentials [i.e. center tapped].

Salmon discloses that the capacitors in series are center tapped [Figs. 1F, 4B, 4D, 5A, 5B, 6A, 13A etc.; col. 10 lines 14-26. Examiner notes that center-tapped series capacitors used in this manner are common in the art- Geis et al (US 5903116) Fig. 4 provides another concrete example of this].

Aiello and Salmon are analogous multiphase ac converters that reduce harmonic distortion with motor loads. At the time of the invention it would have been obvious to one of ordinary skill in the art to add center tapped capacitors in the dc link circuit to Aiello for the purpose of providing a better harmonic correction function of line currents and also to lower line inductance [Salmon US 5936855 col. 10 lines 15-17].

Claim 15 is rejected under 35 U.S.C. 103[a] as being unpatentable over Aiello et al [US 6014323] in view of Nagashima et al [US 6219245].

With respect to Claim 15, Aiello discloses each of said power units includes a plurality of power cells [col. 2 lines 28-35 as many power cells can easily be integrated into a unit as desired], each power cell having a phase module [Fig. 1a any vertical leg of the rectifier or inverter stage], and said DC link circuit [Fig. 1a capacitors 453a and 453b] includes a filter capacitor having opposite terminals charged at different potentials, said phase module including a plurality of direct current buses [Fig. 1a bus 454 and 455] at different potentials, which are connected with said filter capacitor. Aiello does not disclose a cooling header, arranged in parallel to said direct current buses for guiding a cooling medium to flow there through.

Nagashima discloses a cooling header [Abstract, Fig. 1], arranged in parallel to said direct current buses for guiding a cooling medium to flow there through [col. 1 lines 14-24 and 29-35].

Aiello and Nagashima are analogous uses of power converters to supply heavy loads, which results in undesired heating of the power converters due to switching and high current flow. At the time of the invention, it would have been obvious to one of ordinary skill in the art to add a cooling medium to Aiello for the purpose of reducing the heat output of the power converter due to switching and the heavy load presented by the 3-phase ac motor.

Claim 17 is rejected under 35 U.S.C. 103[a] as being unpatentable over Aiello et al [US 6014323] in view of Geis et al [US 5903116].

With respect to Claim 17, Aiello discloses said polyphase AC load comprises an electric motor for driving a compressor [col. 1 lines 10-24]. Aiello does not specify his

AC supply is a turbogenerator [applicant notes that the ac supply could be anything suitable].

Geis discloses said first polyphase AC power supply includes a turbogenerator [turbogenerator 10] group including a plurality of turbogenerators [as many turbogenerators can be connected as desired in as many groups as desired to increase capacity].

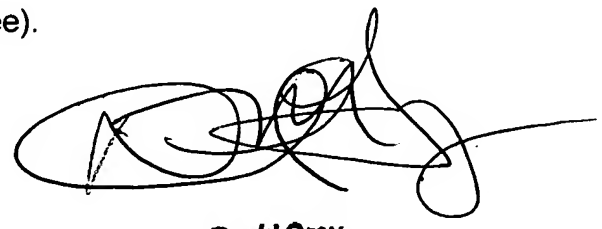
Aiello and Geis are analogous ac motor controllers. At the time of the invention it would have been obvious to one of ordinary skill in the art to add a variable supply converter to Geis for the benefit of utilizing the power converter as a controller for the turbogenerator [see Geis Abstract].

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard V. Muralidar whose telephone number is 571-272-8933. The examiner can normally be reached on Monday to Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Gray can be reached on Monday to Friday 8-5. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



RVM
02/03/2006

David Gray
Primary Examiner